NOVEMBER/DECEMBER 2025

23UECA12B/23UEDA12B/23UECS12A/ 23UESC12A — NUMERICAL METHODS — I

Time : Three hours Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. What is called the method of Least Square?
2. Write down the types of best Fitting Curves.
3. Why is the Newton-Raphson method preferred over the Bisection method?
4. What kind of equations are called Transcendental Equations?
5. How does the Gauss-Jordan method differ from Gauss Elimination?
6. What is a key requirement for the convergence of the Gauss Jacobi method?
7. What is the Backward Difference Operator?

8. State the Gregory-Newton Forward Interpolation formula.

9. Name the difference operators μ, δ.

10. What is Stirling's formula and when is it preferred?

SECTION B — ($5 \times 5 = 25$ marks)

Answer ALL questions.

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11. (a) By the method of least squares, find the straight line that best fits the following data.

x :	5	10	15	20	25
y :	15	19	23	26	30

Or

(b) Fit a parabola, by the method of least squares, to the following data; also estimate y at $x = 6$.

x :	1	2	3	4	5
y :	5	12	26	60	97

19. Express in factorial polynomials and get their successive forward differences, by taking $h = 1$.

(a) $x^4 + 3x^2 - 5x^2 + 6x - 7$

(b) $3x^3 - 2x^2 + 7x - 6$

(c) $x^3 + x^2 + x + 1$

20. Apply Bessel's formula t6 find the value of (27.5) from the table :

X	25	26	27	28	29	30
$F(x)$	4	3.846	3.704	3.571	3.448	3.333

12. (a) Find an approximate root of $x \log_{10} x - 1.2 = 0$ by False position method.

Or

(b) Using Newton's method, find the root between 0 and 1 of $x^3 = 6x - 4$ correct to 5 decimal places.

13. (a) Solve the system of equation by Gauss elimination method :

$x + 2y + z = 3$
$2x + 3y + 3z = 10$
$3x - y + 2z = 13$

Or

(b) Solve the system of equation by Gauss-Jordon method.

$10x + y + z = 13$
$2x + 10y + z = 14$
$z + y + 15z = 32$

14. (a) Find the 7th term of the sequence 2, 9, 28, 65, 126, 217 and also find the general term.

Or

(b) From the following data find è at $x = 84$. Also express è in terms of x.

x :	40	50	60	70	80	90
y :	184	204	226	250	276	304

15. (a) Find $f(22)$ from the Gauss forward formula.

X	20	25	30	35	40	45
$F(X)$	354	332	291	260	231	204

Or

(b) Interpolate by means of Gauss's backward formula, the population of a town for the year 1974, given that

Year	1939	1949	1959	1969	1979	1989
Population (in thousands)	12	15	20	27	39	52

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SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. Fit a curve of the form $y = ax^b$ fits to the data given below. Find the best values of a and b.

x :	1	2	3	4	5	6
y :	1200	900	600	200	110	50

17. Find a positive root of the equation $x^3 - 4x - 9$ by bisection method.

18. Solve the following system by the method of Triangularization :

$5x - 2y + z = 4,$
$7x + y - 5z = 8,$
$3x + 7y + 4z = 10$